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(54) Title: FABRIC CARE COMPOSITION

(57) Abstract: A fabric care composition comprises a polymeric material which is capable of self cross-linking and/or of reacting with cellulose together with one or more textile compatible carriers, wherein the polymeric material comprises one or more poly(oxyalkylene) groups having an end group which comprises one or more amino groups or derivatives of said amino groups. The compositions may be used to treat fabric as part of a laundering process and improve the surface colour definition of the fabric following multiple washings.

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## FABRIC CARE COMPOSITION

### Technical Field

- 5 This invention relates to fabric care compositions and to methods of treating fabric using the compositions or the polymeric materials they contain.

### Background and Prior Art

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- The laundry process generally has several benefits for fabric, the most common being to remove dirt and stains from the fabric during the wash cycle and to soften the fabric during the rinse cycle. However, there are numerous  
15 disadvantages associated with repeated use of conventional laundry treatment compositions and/or the actual laundry process; one of these being a fairly harsh treatment of fabric in the laundry process.

- 20 Fabrics can be damaged in several ways as a result of repeated laundering and/or wear. Fabric pilling and loss of fabric surface appearance e.g. fuzzing, shrinkage (or expansion), loss of colour from the fabric or running of colour on the fabric (usually termed dye transfer) are some  
25 of the common problems associated with repeated laundering. These problems may occur merely from repeated hand washing as well as the more vigorous machine washing process. Furthermore, problems relating to damage of fabric over time through normal use, such as loss of shape and increased  
30 likelihood of wrinkling are also significant.

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The present invention is directed towards alleviating one or more of the problems referred to hereinabove.

The principal advantage of the present invention relates to  
5 improving the surface colour definition of a fabric after  
multiple washings and/or to imparting pill and/or fuzz  
resistance to fabric during laundering. The invention can  
have further advantages in the treatment of fabric. For  
example, other aspects of the overall appearance of the  
10 fabric can be improved, such as a reduction in the tendency  
of the fabric to become creased and/or wrinkled.

Laundry detergent compositions containing polyamide-  
polyamine fabric treatment agents are described in WO  
15 98/29530. The compositions are claimed to impart improved  
overall appearance to fabrics laundered using the detergent  
compositions, in terms of surface appearance properties such  
as pill/fuzz reduction and antifading. Laundry compositions  
containing polyamide-polyamine treatment agents of similar  
20 types are taught in WO 97/42287.

Laundry compositions containing polyamide-polyamine fabric  
treatment agents can exhibit increased dye pick-up (ie,  
increased dye transfer) and poor stain removal properties  
25 compared to other conventional laundry compositions.

US 5571286 (Connell et al) discloses certain polymers and  
prepolymers derived from polyoxyalkyleneamines and their use  
in a process for shrink-proofing wool. The treated wool may  
30 also have a softer handle than untreated wool. This  
document does not mention the treatment of cellulosic

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fabrics or the problems of loss of fabric surface appearance that they can experience following laundering. Furthermore, it deals entirely with treatment of wool on an industrial scale and does not mention the application of the  
5 compositions to fabric in the context of laundering processes.

The present invention is based on the surprising finding that certain polymeric materials, including those described  
10 in US 5571286, can impart improved surface appearance to cellulosic fabrics. The polymeric materials can have the further advantage of reduced adverse side-effects, in terms of increased dye transfer and poor stain removal, for example, compared to certain compositions containing  
15 polyamide-polyamine fabric treatment agents.

#### Definition of the Invention

According to the present invention, there is provided a  
20 fabric care composition comprising a polymeric material which is capable of self cross-linking and/or of reacting with cellulose together with one or more textile compatible carriers, in which when the textile compatible carrier is water a further additive suitable for use in laundry  
25 compositions is present, wherein the polymeric material comprises one or more poly(oxyalkylene) groups having an end group which comprises one or more amino groups or derivatives of said amino groups.

30 The invention also provides a method of treating fabric, as part of a laundering process, which comprises applying to

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the fabric a fabric care composition of the invention or a polymeric material which is a component of the fabric care composition of the invention.

5 Further provided by the invention in another aspect is the use of a fabric care composition of the invention or a polymeric material which is a component of the fabric care composition of the invention to improve the surface colour definition of a fabric after multiple washings.

10

In another aspect, the invention provides the use of a fabric care composition of the invention or a polymeric material which is a component of the fabric care composition of the invention to impart pill and/or fuzz resistance to  
15 fabric during laundering. In addition, the invention can impart other beneficial properties to the fabric, such as reduced creasing and/or wrinkling of the fabric during laundering.

20 Detailed Description of the Invention

The compositions of the present invention comprise a polymeric material which is capable of self cross-linking and/or of reacting with cellulose together with  
25 one or more textile compatible carriers, wherein the polymeric material comprises one or more poly(oxyalkylene) groups having an end group which comprises one or more amino groups or derivatives of said amino groups.

30

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The compositions of the invention have the surprising advantage of imparting wear resistance to fabrics, and thereby causing improved surface colour definition of the fabric after laundering, particularly after multiple washings. Furthermore, the polymeric materials contained in the compositions need not cause unacceptable dye transfer and/or stain removal problems.

The polymeric material which can be used in the present invention can be any of the polymers or prepolymers derived from polyoxyalkyleneamines that are described in US 5571286, the contents of which are incorporated herein by reference. Methods for preparing the polymeric materials are described in US 5571286. Hence the polymeric material can be, for example, the reaction product of a diamine or triamine polyoxyalkylene polymer having a polymerisation degree of from 4 to 50 or a mixture thereof with epichlorohydrin in a ratio of epichlorohydrin to amino nitrogen of from 1:1 to 3:1.

The amino groups in the polymeric material of the invention may wholly or partly in the form of derivatives of amino groups. Derivatives include, for example, adducts formed by alkylation or hydroxyalkylation at the nitrogen atom or by the formation of an amide group at the nitrogen atom. The derivatives may be formed by the reaction of the amino groups with a bifunctional bridging agent or with a cross-linking agent.

Preferably, the polymeric material is obtainable by the reaction of a polymer of formula  $B(R)_n$ , wherein  $n$  is from 1

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- to 20, B is a backbone group to which each R is covalently bonded and R is a group comprising a poly(oxyalkylene) chain, which chain comprises an amino end group, the polymer being optionally reacted with a bridging compound, with a cross-linking agent. It will thus be appreciated that the polymeric material of the invention is a relatively complex mixture comprising a number of different compounds, some or all of which may be cross-linked.
- 10 The poly(oxyalkylene) chain which forms a part of the R group may be, for example, a poly(oxyethylene), poly(oxybutylene) or poly(oxyprop-1,2-ylene) chain. The length of the chain can vary from 2 to 100 repeat units.
- 15 Conveniently, n is 2 or 3. It will be appreciated that n may not be a whole number where the polymeric material of the invention comprises a mixture of different polymers of formula  $B(R)_n$ .
- 20 In some of the polymeric materials which may be used in the invention, B is
- O-CH<sub>2</sub> (CH)<sub>m</sub>-CH<sub>2</sub>-O- (ie, B is the residue of glycerol when m is 1) and m is equal
- |
- 25                   O
- |
- to n-2.

- However, B can also represent other values such as , for example, the residue of other triols or the residue of a di-, tetra-, penta- or hexa- hydroxy compound. Alternatively, B can represent the residue of a di-, tri- or poly- amine.
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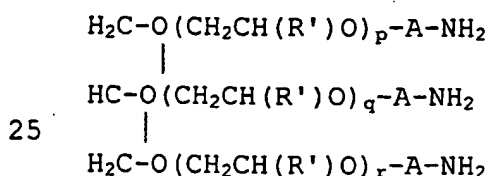
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Preferably, at least one R group has the formula -  
 $(\text{CH}_2\text{CH}(\text{R}')(\text{CH}_2)_a\text{O})_p\text{-A-NHR}'$ , wherein: R' is H or CH<sub>3</sub>; a is 0,  
 1 or 2; p is an integer from 5 to 30; A is an alkylene  
 5 group; and R' is H or alkyl. More preferably, p is from 10  
 to 25.

The term "alkyl", as used herein, includes C<sub>1</sub> to C<sub>6</sub> alkyl,  
 optionally substituted on the alkyl chain, which may be  
 10 branched or unbranched and, for C<sub>3</sub> to C<sub>6</sub> alkyl, may be  
 cyclic. The term "alkylene" is defined similarly but refers  
 to a divalent radical.

It will be appreciated that the term "end group" refers to  
 15 the group at or near to the end of the poly(oxyalkylene)  
 chain, which end, when the polymer is of formula B(R)<sub>n</sub>, is at  
 the other end of the polymer chain from the end which is  
 attached to B.

20 Suitable polymers of formula B(R)<sub>n</sub> include those having the  
 following structure:

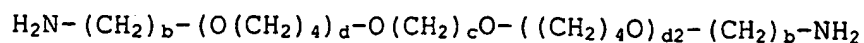


wherein R' is as defined herein before, p, q and r are  
 integers which may be the same or different and may be from  
 30 5 to 30 and A is branched or unbranched lower alkylene.



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Other suitable polymers of formula  $B(R)_n$ , in which  $n$  is equal to 2, include those having the following formula:



wherein:  $b$  is an integer from 1 to 6, preferably 3;  $c$  is an integer from 1 to 6, preferably 4; and  $d$  and  $d2$  are the same or different and are integers from 10 to 15.

The cross-linking agent which is used to form the polymeric material of the invention by reaction with the polymer, or the polymer after prior reaction with the bridging compound, preferably comprises an epihalohydrin. Epichlorohydrin is a suitable epihalohydrin.

Preferably the molar ratio of cross-linking agent to polymer of formula  $B(R)_n$  is from 0.5:1 to 4:1. Other amounts of cross-linking agent may be present in the polymeric material of the invention.

Suitable bridging compounds comprise two epoxide or carboxylic acid groups. The epoxide or carboxylic acid groups may be linked by a linker comprising alkylene, arylene, poly(oxyalkylene) or siloxane groups or combinations thereof. Examples of bridging compounds therefore include benzene-1,4-dicarboxylic acid, hexane-1,6-dicarboxylic acid and poly(oxyethylene) compounds terminated at both ends of the molecule by an epoxide group. Other suitable bridging compounds are disclosed in US 5571286.

The composition of the invention can contain the polymeric material, optionally together with other polymeric materials. The compositions may further comprise a silicone

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which is capable of reacting with the polymeric material. Suitable reactive silicones include those having amino or hydroxyl groups which are well-known to those skilled in the art.

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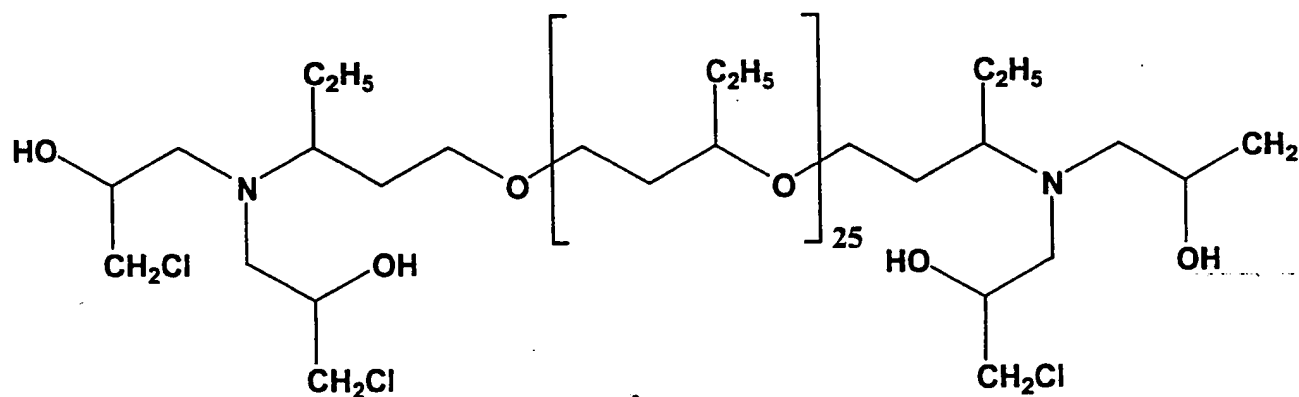
Preferably, the polymeric material is capable of increasing the wet strength of paper by at least 200% compared to untreated paper when applied to paper having a weight of 80 g/m<sup>2</sup> at a level of 1% solids by weight based on weight of paper, according to the test method described hereinafter.

10

Polymeric materials which are suitable for use in the present invention are available from Precision Processes Textiles (Ambergate, Derbyshire, UK) under the trade marks  
15 POLYMER AM and POLYMER MRSM. The polymeric materials of the invention are preferably in the form of aqueous solutions.

Polymer AM is a polymer having the following structure:

20



POLYMER AM

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Polymer MRSM has the same structures as polymer AM but has silicone added to the polymer mixture.

5

The nature of the textile compatible carrier will be dictated to a large extent by the stage at which the composition of the invention is used in a laundering process, the compositions being capable of being used, in principle, at any stage of the process. For example, where the compositions are for use as main wash detergent compositions, the one or more textile compatible carriers comprise a detergent active compound. Where the compositions are for use in the rinsing step of a laundering process, the one or more textile compatible carriers may comprise a fabric softening and/or conditioning compound.

The compositions of the invention preferably comprise a perfume, such as of the type which is conventionally used in fabric care compositions. The compositions may be packaged and labelled for use in a domestic laundering process.

The polymeric material is preferably present in the product in a sufficient quantity to give an amount of 0.0005% to 5% by weight on the fabric based on the weight of the fabric, more preferably 0.001% to 2% by weight on fabric. The amount of the polymeric material in the composition required to achieve the above % by weight on fabric will typically be in the range 0.01% to 35% by weight, preferably 0.1 to 13.5% by weight.

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The compositions of the invention, when applied to a fabric, can impart benefits to the fabric when uncured. However, they may be cured by a domestic curing step including ironing and/or domestic tumble drying, preferably tumble  
5 drying. The curing is preferably carried out at a temperature in the range of from 50 to 100°C, more preferably from 80 to 100°C.

In the context of the present invention the term "textile  
10 compatible carrier" is a component which can assist in the interaction of the first component with the fabric. The carrier can also provide benefits in addition to those provided by the first component e.g. softening, cleaning  
etc. The carrier may be water, in which case the  
15 composition of the invention will contain another additive, suitable for use in laundry compositions such as perfume, for example, or the carrier may be a detergent-active compound or a fabric softener or conditioning compound or other suitable detergent or fabric treatment agent.

20 If the composition of the invention is to be used in a laundry process as part of a conventional fabric treatment product, such as a detergent composition, the textile-compatible carrier will typically be a detergent-active  
25 compound. Whereas, if the fabric treatment product is a rinse conditioner, the textile-compatible carrier will be a fabric softening and/or conditioning compound.

If the composition of the invention is to be used before, or  
30 after, the laundry process it may be in the form of a spray or foaming product.

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The fabrics which may be treated in the present invention include those which comprise cellulosic fibres, preferably from 1% to 100% cellulosic fibres (more preferably 5% to 100% cellulosic fibres, most preferably 40% to 100%). The fabric may be in the form of a garment, in which case the method of the invention may represent a method of laundering a garment. When the fabric contains less than 100% cellulosic fibres, the balance comprises other fibres or blends of fibres suitable for use in garments such as polyester, for example. Preferably, the cellulosic fibres are of cotton or regenerated cellulose such as viscose.

The laundering processes of the present invention include the large scale and small scale (eg domestic) cleaning of fabrics. Preferably, the processes are domestic.

In the invention, the polymeric material or the composition of the invention may be used at any stage of the laundering process. Preferably, the composition or the polymeric material is used to treat the fabric in the rinse cycle of a laundering process. The rinse cycle preferably follows the treatment of the fabric with a detergent composition.

Detergent Active Compounds

If the composition of the present invention is in the form  
5 of a detergent composition, the textile-compatible carrier  
may be chosen from soap and non-soap anionic, cationic,  
nonionic, amphoteric and zwitterionic detergent active  
compounds, and mixtures thereof.

10 Many suitable detergent active compounds are available and  
are fully described in the literature, for example, in  
"Surface-Active Agents and Detergents", Volumes I and II, by  
Schwartz, Perry and Berch.

15 The preferred textile-compatible carriers that can be used  
are soaps and synthetic non-soap anionic and nonionic  
compounds.

Anionic surfactants are well-known to those skilled in the  
20 art. Examples include alkylbenzene sulphonates,  
particularly linear alkylbenzene sulphonates having an alkyl  
chain length of C<sub>8</sub>-C<sub>15</sub>; primary and secondary alkylsulphates,  
particularly C<sub>8</sub>-C<sub>15</sub> primary alkyl sulphates; alkyl ether  
sulphates; olefin sulphonates; alkyl xylene sulphonates;  
25 dialkyl sulphosuccinates; and fatty acid ester sulphonates.  
Sodium salts are generally preferred.

Nonionic surfactants that may be used include the primary  
and secondary alcohol ethoxylates, especially the C<sub>8</sub>-C<sub>20</sub>  
30 aliphatic alcohols ethoxylated with an average of from 1 to  
20 moles of ethylene oxide per mole of alcohol, and more

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especially the C<sub>10</sub>-C<sub>15</sub> primary and secondary aliphatic alcohols ethoxylated with an average of from 1 to 10 moles of ethylene oxide per mole of alcohol. Non-ethoxylated nonionic surfactants include alkylpolyglycosides, glycerol monoethers, and polyhydroxyamides (glucamide).

Cationic surfactants that may be used include quaternary ammonium salts of the general formula  $R_1R_2R_3R_4N^+ X^-$  wherein the R groups are independently hydrocarbyl chains of C<sub>1</sub>-C<sub>22</sub> length, typically alkyl, hydroxyalkyl or ethoxylated alkyl groups, and X is a solubilising anion (for example, compounds in which R<sub>1</sub> is a C<sub>8</sub>-C<sub>22</sub> alkyl group, preferably a C<sub>8</sub>-C<sub>10</sub> or C<sub>12</sub>-C<sub>14</sub> alkyl group, R<sub>2</sub> is a methyl group, and R<sub>3</sub> and R<sub>4</sub>, which may be the same or different, are methyl or hydroxyethyl groups); and cationic esters (for example, choline esters) and pyridinium salts.

The total quantity of detergent surfactant in the composition is suitably from 0.1 to 60 wt% e.g. 0.5-55 wt%, such as 5-50wt%.

Preferably, the quantity of anionic surfactant (when present) is in the range of from 1 to 50% by weight of the total composition. More preferably, the quantity of anionic surfactant is in the range of from 3 to 35% by weight, e.g. 5 to 30% by weight.

Preferably, the quantity of nonionic surfactant when present is in the range of from 2 to 25% by weight, more preferably from 5 to 20% by weight.

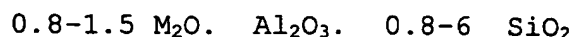
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Amphoteric surfactants may also be used, for example amine oxides or betaines.

The compositions may suitably contain from 10 to 70%, preferably from 15 to 70% by weight, of detergency builder. Preferably, the quantity of builder is in the range of from 15 to 50% by weight.

The detergent composition may contain as builder a crystalline aluminosilicate, preferably an alkali metal aluminosilicate, more preferably a sodium aluminosilicate.

The aluminosilicate may generally be incorporated in amounts of from 10 to 70% by weight (anhydrous basis), preferably from 25 to 50%. Aluminosilicates are materials having the general formula:



where M is a monovalent cation, preferably sodium. These materials contain some bound water and are required to have a calcium ion exchange capacity of at least 50 mg CaO/g. The preferred sodium aluminosilicates contain 1.5-3.5  $\text{SiO}_2$  units in the formula above. They can be prepared readily by reaction between sodium silicate and sodium aluminate, as amply described in the literature.

#### Fabric Softening and/or Conditioner Compounds

If the composition of the present invention is in the form of a fabric conditioner composition, the textile-compatible



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carrier will be a fabric softening and/or conditioning compound (hereinafter referred to as "fabric softening compound"), which may be a cationic or nonionic compound.

- 5 The softening and/or conditioning compounds may be water insoluble quaternary ammonium compounds. The compounds may be present in amounts of up to 8% by weight (based on the total amount of the composition) in which case the compositions are considered dilute, or at levels from 8% to  
10 about 50% by weight, in which case the compositions are considered concentrates.

Compositions suitable for delivery during the rinse cycle may also be delivered to the fabric in the tumble dryer if  
15 used in a suitable form. Thus, another product form is a composition (for example, a paste) suitable for coating onto, and delivery from, a substrate e.g. a flexible sheet or sponge or a suitable dispenser during a tumble dryer cycle.

- 20 Suitable cationic fabric softening compounds are substantially water-insoluble quaternary ammonium materials comprising a single alkyl or alkenyl long chain having an average chain length greater than or equal to C<sub>20</sub> or, more  
25 preferably, compounds comprising a polar head group and two alkyl or alkenyl chains having an average chain length greater than or equal to C<sub>14</sub>. Preferably the fabric softening compounds have two long chain alkyl or alkenyl chains each having an average chain length greater than or  
30 equal to C<sub>16</sub>. Most preferably at least 50% of the long chain alkyl or alkenyl groups have a chain length of C<sub>18</sub> or above.

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It is preferred if the long chain alkyl or alkenyl groups of the fabric softening compound are predominantly linear.

Quaternary ammonium compounds having two long-chain  
5 aliphatic groups, for example, distearyldimethyl ammonium chloride and di(hardened tallow alkyl) dimethyl ammonium chloride, are widely used in commercially available rinse conditioner compositions. Other examples of these cationic  
10 compounds are to be found in "Surface-Active Agents and Detergents", Volumes I and II, by Schwartz, Perry and Berch. Any of the conventional types of such compounds may be used in the compositions of the present invention.

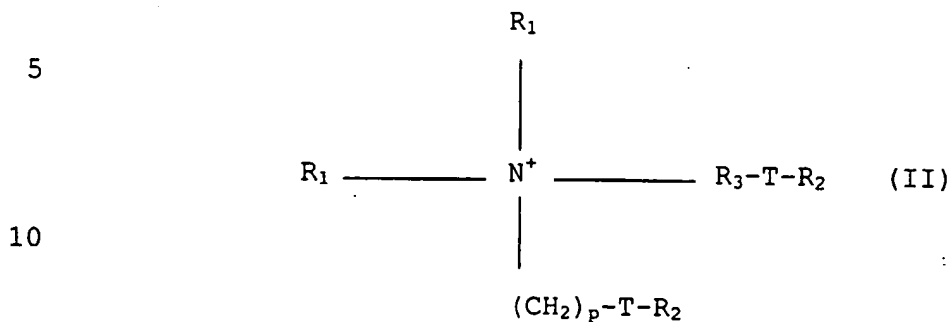
The fabric softening compounds are preferably compounds that  
15 provide excellent softening, and are characterised by a chain melting  $L\beta$  to  $L\alpha$  transition temperature greater than  $25^{\circ}\text{C}$ , preferably greater than  $35^{\circ}\text{C}$ , most preferably greater than  $45^{\circ}\text{C}$ . This  $L\beta$  to  $L\alpha$  transition can be measured by DSC as defined in "Handbook of Lipid Bilayers", D Marsh, CRC  
20 Press, Boca Raton, Florida, 1990 (pages 137 and 337).

Substantially water-insoluble fabric softening compounds are defined as fabric softening compounds having a solubility of less than  $1 \times 10^{-3}$  wt % in demineralised water at  $20^{\circ}\text{C}$ . Preferably the fabric softening compounds have a solubility  
25 of less than  $1 \times 10^{-4}$  wt%, more preferably less than  $1 \times 10^{-8}$  to  $1 \times 10^{-6}$  wt%.

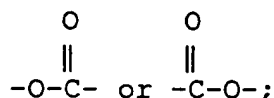
Especially preferred are cationic fabric softening compounds that are water-insoluble quaternary ammonium materials  
30 having two  $\text{C}_{12-22}$  alkyl or alkenyl groups connected to the molecule via at least one ester link, preferably two ester

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links. An especially preferred ester-linked quaternary ammonium material can be represented by the formula II:



wherein each  $\text{R}_1$  group is independently selected from  $\text{C}_{1-4}$  alkyl or hydroxyalkyl groups or  $\text{C}_{2-4}$  alkenyl groups; each  $\text{R}_2$  group is independently selected from  $\text{C}_{8-28}$  alkyl or alkenyl groups; and wherein  $\text{R}_3$  is a linear or branched alkylene group of 1 to 5 carbon atoms, T is

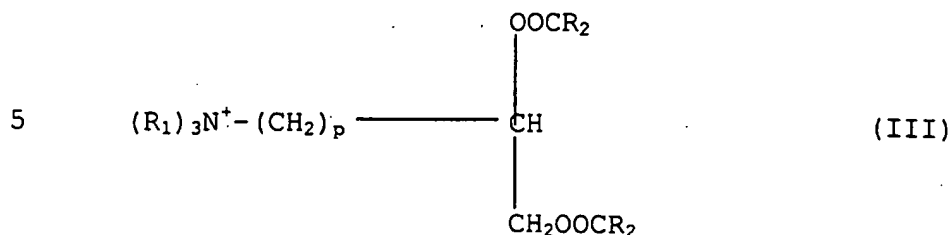


and  $p$  is 0 or is an integer from 1 to 5.

Di(tallowoxyloxyethyl) dimethyl ammonium chloride and/or its hardened tallow analogue is especially preferred of the compounds of formula (II).

A second preferred type of quaternary ammonium material can be represented by the formula (III):

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10 wherein  $\text{R}_1$ ,  $p$  and  $\text{R}_2$  are as defined above.

It is advantageous if the quaternary ammonium material is biologically biodegradable.

15 Preferred materials of this class such as 1,2-bis(hardened tallowoyloxy)-3-trimethylammonium propane chloride and their methods of preparation are, for example, described in US 4 137 180 (Lever Brothers Co). Preferably these materials comprise small amounts of the corresponding  
20 monoester as described in US 4 137 180, for example, 1-hardened tallowoyloxy-2-hydroxy-3-trimethylammonium propane chloride.

Other useful cationic softening agents are alkyl pyridinium  
25 salts and substituted imidazoline species. Also useful are primary, secondary and tertiary amines and the condensation products of fatty acids with alkylpolyamines.

The compositions may alternatively or additionally contain  
30 water-soluble cationic fabric softeners, as described in GB 2 039 556B (Unilever).

- 20 -

The compositions may comprise a cationic fabric softening compound and an oil, for example as disclosed in EP-A-0829531.

- 5 The compositions may alternatively or additionally contain nonionic fabric softening agents such as lanolin and derivatives thereof.

Lecithins are also suitable softening compounds.

10

Nonionic softeners include L $\beta$  phase forming sugar esters (as described in M Hato et al Langmuir 12, 1659, 1666, (1996)) and related materials such as glycerol monostearate or sorbitan esters. Often these materials are used in

- 15 conjunction with cationic materials to assist deposition (see, for example, GB 2 202 244). Silicones are used in a similar way as a co-softener with a cationic softener in rinse treatments (see, for example, GB 1 549 180).

- 20 The compositions may also suitably contain a nonionic stabilising agent. Suitable nonionic stabilising agents are linear C<sub>8</sub> to C<sub>22</sub> alcohols alkoxylated with 10 to 20 moles of alkylene oxide, C<sub>10</sub> to C<sub>20</sub> alcohols, or mixtures thereof.

- 25 Advantageously the nonionic stabilising agent is a linear C<sub>8</sub> to C<sub>22</sub> alcohol alkoxylated with 10 to 20 moles of alkylene oxide. Preferably, the level of nonionic stabiliser is within the range from 0.1 to 10% by weight, more preferably from 0.5 to 5% by weight, most preferably from 1 to 4% by  
30 weight. The mole ratio of the quaternary ammonium compound and/or other cationic softening agent to the nonionic

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stabilising agent is suitably within the range from 40:1 to about 1:1, preferably within the range from 18:1 to about 3:1.

- 5 The composition can also contain fatty acids, for example  $C_8$  to  $C_{24}$  alkyl or alkenyl monocarboxylic acids or polymers thereof. Preferably saturated fatty acids are used, in particular, hardened tallow  $C_{16}$  to  $C_{18}$  fatty acids. Preferably the fatty acid is non-saponified, more preferably
- 10 the fatty acid is free, for example oleic acid, lauric acid or tallow fatty acid. The level of fatty acid material is preferably more than 0.1% by weight, more preferably more than 0.2% by weight. Concentrated compositions may comprise from 0.5 to 20% by weight of fatty acid, more preferably 1%
- 15 to 10% by weight. The weight ratio of quaternary ammonium material or other cationic softening agent to fatty acid material is preferably from 10:1 to 1:10.

- The fabric conditioning compositions may include silicones,
- 20 such as predominately linear polydialkylsiloxanes, e.g. polydimethylsiloxanes or aminosilicones containing amine-functionalised side chains; soil release polymers such as block copolymers of polyethylene oxide and terephthalate; amphoteric surfactants; smectite type inorganic clays;
- 25 zwitterionic quaternary ammonium compounds; and nonionic surfactants.

- The fabric conditioning compositions may also include an agent which produces a pearlescent appearance, e.g. an
- 30 organic pearlising compound such as ethylene glycol

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distearate, or inorganic pearllising pigments such as microfine mica or titanium dioxide (TiO<sub>2</sub>) coated mica.

The fabric conditioning compositions may be in the form of emulsions or emulsion precursors thereof.

Other optional ingredients include emulsifiers, electrolytes (for example, sodium chloride or calcium chloride) preferably in the range from 0.01 to 5% by weight, pH buffering agents, and perfumes (preferably from 0.1 to 5% by weight).

Further optional ingredients include non-aqueous solvents, perfume carriers, fluorescers, colourants, hydrotropes, antifoaming agents, antiredeposition agents, enzymes, optical brightening agents, opacifiers, dye transfer inhibitors, anti-shrinking agents, anti-wrinkle agents, anti-spotting agents, germicides, fungicides, anti-oxidants, UV absorbers (sunscreens), heavy metal sequestrants, chlorine scavengers, dye fixatives, anti-corrosion agents, drape imparting agents, antistatic agents and ironing aids. This list is not intended to be exhaustive.

#### Fabric Treatment Products

The composition of the invention may be in the form of a liquid, solid (e.g. powder or tablet), a gel or paste, spray, stick or a foam or mousse. Examples including a soaking product, a rinse treatment (e.g. conditioner or finisher) or a mainwash product. The composition may also be applied to a substrate e.g. a flexible sheet or used in a

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dispenser which can be used in the wash cycle, rinse cycle or during the dryer cycle.

The invention will now be described by way of example only  
5 and with reference to the following non-limiting examples.

#### EXAMPLES

10 POLYMER AM (trade mark) and POLYMER MRSM (trade mark) are polymeric materials according to the invention and were obtained from Precision Processes Textiles of Ambergate, Derbyshire, UK.

15 Test method for assessing wet-strength resins on paper by tensile strength

The test procedure used was as follows:

20 Paper selected = 80 gsm White Copier Bond, 210 x 297 mm, Universal Office Supplies ref UCOP80. Dry weight of one A4 sheet = 4.91 g. Weight after 30 minute soak and removal of excess water = 7.30 g. Pick-up therefore set as 50%.

25 For the untreated standard, the paper was soaked in deionised water for 10 minutes in a shallow tray. After this time, sheets were removed and the excess water removed by gently patting with paper towels until all surface water had been removed. The paper was then dried at 110°C for 10  
30 minutes in a fan-assisted oven.



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For the treated sample, a solution of Polymer AM or Polymer MRSM (trade mark) with water was prepared along with 2 g/l of sodium bicarbonate to provide an application level by pick-up of 1% o.w.f.

5

As with the reference, the treated samples are soaked for 10 minutes in the solution, the excess water removed and then dried/cured as above.

10 The paper is then allowed to stand for at least 24 hours (as the tensile strength measurements are carried out on saturated paper, it is not necessary to condition the paper at 65% RH).

15 The samples are cut using a guillotine to 270 mm by 67 mm, and lines are drawn parallel to the smaller length 35 mm in to act as a guide when clamping the sample into the Testometric jaws.

20 The samples are then soaked in deionised water for 30 minutes.

After this time, the majority of the water is drained away to leave the paper saturated while measurements are made.

25 Prior to the test being performed, the excess water is removed as before.

Testometric set-up - 25 kgf load cell, 100 mm/min speed, pre-tension 0.1 kgf, sample length 200 mm, sample width 67

30 mm.

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The results of the tests were as follows:

Sample treatment	Wet strength (kgf)
Untreated paper	1.069
Polymer AM	4.920
Polymer MRSM	4.017

### Example 1

#### 5 Dye transfer inhibition

Five applications of 0.2% Kenores 1440 (trade mark) polyamine-epichlorohydrin (PAE) resin (Akzo Nobel) as disclosed in WO 97/42287 (a polymer outside the scope of  
10 this invention) were made via a domestic washing machine (Zanussi (trade mark) automatic washing machine, 40°C cotton wash cycle, Persil (trade mark) applied during the wash cycle) to white woven cotton sheeting, a theoretical maximum application of 1.0% by weight PAE on weight of fabric (owf).  
15 A similar process was carried out using 0.2% Polymer AM (trade mark) and 0.2% Polymer MRSM (trade mark). The treated fabrics were then washed with Direct Red 80 dyed fabric which is known to lose dye. The resulting fabrics were then measured on a Spectroflash (trade mark)  
20 spectrometer to determine the degree of dye transfer. A blank fabric sample was used as reference.

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	$\Delta L$	$\Delta E$
0.2% Kenores 1440	-3.47	6.20
0.1% Kenores 1440	-1.05	2.32
Polymer AM	0.93	2.21
Polymer MRSM	0.28	1.47

$\Delta L$  = change in lightness

$\Delta E$  = change in colour

- 5 Thus, there is less change in colour for the fabric treated with a polymer according to the invention and, therefore, less dye transfer.

### Example 2

#### 10 **Garment Care Properties**

- Spectroflash (trade mark) measurements on a standard test fabric having black and red regions show that the fabrics treated with Polymer AM (trade mark) and Polymer MRSM (trade mark) according to Example 1 display reduced damage.
- 15

Black area:

	$\Delta L$	$\Delta E$
Untreated	9.94	10.07
Polymer AM	1.81	1.95
Polymer MRSM	3.00	3.09

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Red area:

	$\Delta L$	$\Delta E$
Untreated	3.30	12.62
Polymer AM	1.20	5.39
Polymer MRSM	1.19	4.84

In both cases, the treated areas show less change in shade  
5 than the untreated sample, indicated by the smaller  $\Delta L$  and  
 $\Delta E$  values.

**Example 3****Stain removal**

10

1 ml of red wine was applied to treated cotton according to  
the procedure set out in Example 1 (5 rinse applications of  
0.2% per wash). The stain was measured on a Spectroflash  
(trade mark) spectrophotometer prior to washing and after  
15 washing at 40°C using Persil Performance Biological (trade  
mark) powder. The change in depth of colour on the stains  
relative to the sample before washing was:

	$\Delta L$	$\Delta E$
Untreated	-17.93	22.10
Polymer AM	-20.26	23.98
Polymer MRSM	-23.36	26.37
Kenores 1440	-19.38	22.37

20 After washing, the colour measurements were:

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	$\Delta L$	$\Delta E$
Untreated	-3.97	5.94
Polymer AM	-3.65	5.10
Polymer MRSM	-5.70	7.98
Kenores 1440	-8.42	10.45

Polymer AM (trade mark) shows almost identical stain release properties to untreated fabric, whereas Polymer MRSM (trade mark) falls between Polymer Am (trade mark) and Kenores 1440 (trade mark).

The background area of the fabric was also measured to provide an indication of any tendency of the treatments to cause soil redeposition. The smaller the spectrometer reading, the less the change in colour and the less soil redeposition.

	$\Delta L$
Untreated	-0.20
Polymer AM	-0.02
Polymer MRSM	-0.19
Kenores 1440	-0.27
Standard rinse conditioner*	-0.05

\*Comfort (trade mark) (Unilever plc, UK)

Although the differences are small, there are still indications that these polymers do not increase the soil redeposition properties of the fabric to the same extent that PAE-type polymers do. In the case of Polymer AM (trade

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mark), there is less redeposition than with the rinse conditioner.

#### Example 4

##### 5 **Fabric Conditioner Formulation**

Fabric conditioner formulations were made by preparing a standard fabric conditioner composition containing components 2 to 8 below and adding component 1 to it, with stirring. Compositions were prepared in both dilute and concentrated forms.

The formulations were as follows:

	Dilute	Concentrate
1. Polymer AM	15.1%	48.7%
2. Water	80.04%	35.86%
3. Antifoam	0.01%	0.03%
4. Genapol*	0.25%	0.75%
5. HEQ	4.20%	13.5%
6. Preservative	0.03%	0.06%
7. Dye	0.07%	0.15%
8. Perfume	0.30%	0.95%

\*a C<sub>12</sub> primary alcohol ethoxylated with 20 moles of ethylene oxide

#### Example 5

20 Polymer AM was pad applied to 2% resinated cotton poplin monitors (40x40cm) to give a pick-up lever of 0.5% owf on the fabric. The monitors were then tumble dried. This was

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carried out four times to give a total level of 2% owf. A similar procedure was carried out for Polymer MRSM and Kenores 1440. The monitors were wetted, scrunched (to simulate creasing in the wash process) then placed in a domestic tumble drier (Miele) with wetted cotton sheeting ballast (1 Kg when dry). The load was then dried until the anti-crease setting on the drier was attained. The monitors were then panelled against AATCC smoothness standards to determine the level of creasing. The monitors were then ironed and the crease process repeated

Polymer	0.5% owf (before ironing)	0.5% owf (after ironing)	2% owf (before ironing)	2% owf (after ironing)
Untreated control	1.4	1.38	1.64	1.54
PAE	1.3	1.44	2.26	1.94
Kenores 1440	2.28	2.06	2.3	2.52
Polymer MRSM	2.1	2.34	2.38	2.8

Polymer AM and Polymer MRSM are considerably less creased than the untreated control. Polymer MRSM treated monitors become even less creased if an ironing step is included.

Polymer AM and Polymer MRSM are considerably less creased than Kenores 1440 especially at the 0.5% owf level.

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Claims

1. Fabric care composition comprising a polymeric material which is capable of self cross-linking and/or of reacting  
 5 with cellulose together with one or more textile compatible carriers, wherein the polymeric material comprises one or more poly(oxyalkylene) groups having an end group which comprises one or more amino groups or derivatives of said amino groups, wherein when the textile compatible carrier is  
 10 water a further additive suitable for use in laundry compositions is present.

2. Composition as claimed in Claim 1, wherein the polymeric material is obtainable by the reaction of a  
 15 polymer of formula  $B(R)_n$ , wherein  $n$  is from 1 to 20,  $B$  is a backbone group to which each  $R$  is covalently bonded and  $R$  is a group comprising a poly(oxyalkylene) chain, which chain comprises an amino end group, the polymer being optionally reacted with a bridging compound, with a cross-linking  
 20 agent.

3. Composition as claimed in Claim 2, wherein  $n$  is 2 or 3.

4. Composition as claimed in Claim 2 or Claim 3, wherein  $B$   
 25 is  $-O-CH_2 (CH)_m-CH_2-O-$  and  $m$  is equal to  $n-2$ .



30 5. Composition as claimed in any one of Claims 2 to 4, wherein at least one  $R$  group has the formula -  
 $(CH_2CH(R'))(CH_2)_aO)_p-A-NHR''$ , wherein:  $R'$  is H or  $CH_3$ ;  $a$  is 0,

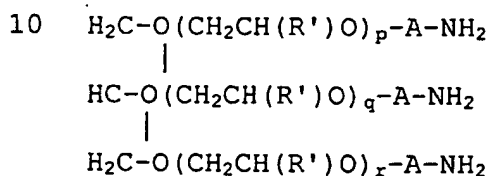


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1 or 2; p is an integer from 5 to 30; A is an alkylene group; and R' is H or alkyl.

5 6. Composition as claimed in any one of Claims 2 to 5, wherein p is from 10 to 25.

7. Composition as claimed in any one of Claims 2 to 6, wherein the polymer of formula B(R)<sub>n</sub> is



wherein p, q and r are integers which may be the same or different and may be from 5 to 30 and A is branched or unbranched lower alkylene.

20 8. Composition as claimed in any one of Claims 2 to 6, wherein the polymer of formula B(R)<sub>n</sub> is  

$$\text{H}_2\text{N}-(\text{CH}_2)_b-(\text{O}(\text{CH}_2)_4)_d-\text{O}(\text{CH}_2)_c-\text{O}((\text{CH}_2)_4)_d-\text{O}(\text{CH}_2)_b-\text{NH}_2$$
 wherein: b is an integer from 1 to 6; c is an integer from 1 to 6; and d and d2 are the same or different and are  
 25 integers from 10 to 15.

9. Composition as claimed in Claim 8, wherein b is 3 and/or c is 4.

30 10. Composition as claimed in any one of Claims 2 to 9, wherein the cross-linking agent comprises an epihalohydrin.

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11. Composition as claimed in any one of Claims 2 to 10 wherein the molar ratio of cross-linking agent to polymer of formula  $B(R)_n$  is from 0.5:1 to 4:1.
- 5 12. Composition as claimed in any one of Claims 2 to 11, wherein the bridging compound comprises two epoxide or carboxylic acid groups.
- 10 13. Composition as claimed in Claim 11, wherein the epoxide or carboxylic acid groups are linked by a linker comprising alkylene, arylene, poly(oxyalkylene) or siloxane groups or combinations thereof.
- 15 14. Composition as claimed in any one of Claims 1 to 13 further comprising a silicone which is capable of reacting with the polymeric material.
- 20 15. Composition as claimed in any one of Claims 1 to 14, wherein the polymeric material is capable of increasing the wet strength of paper by at least 200% compared to untreated paper when applied to paper having a weight of 80 g/m<sup>2</sup> at a level of 1% solids by weight based on weight of paper.
- 25 16. Composition as claimed in any one of Claims 1 to 15, wherein the one or more textile compatible carriers comprise a detergent active compound.
- 30 17. Composition as claimed in any one of Claims 1 to 15, wherein the one or more textile compatible carriers comprise a fabric softening and/or conditioning compound.

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18. Composition as claimed in any one of Claims 1 to 17, further comprising a perfume.

19. A method of treating fabric, as part of a laundering  
5 process, which comprises applying to the fabric a fabric care composition according to any one of Claims 1 to 18.

20. A method of treating fabric, as part of a laundering  
10 process, which comprises applying to the fabric a polymeric material as defined in any one of Claims 1 to 18.

21. A method as claimed in Claim 19 or Claim 20 wherein the composition is applied to the fabric during a wash cycle.

15 22. A method as claimed in Claim 19, or Claim 20, wherein the composition is applied to the fabric during a rinse cycle.

23. Use of a fabric care composition according to any one  
20 of Claims 1 to 18 or a polymeric material as defined in any one of Claims 1 to 18 to improve the surface colour definition of a fabric after multiple washings.

24. Use of a fabric care composition according to any one  
25 of Claims 1 to 18 or a polymeric material as defined in any one of Claims 1 to 18 to impart pill and/or fuzz resistance to fabric during laundering.

25. Use as claimed in Claim 23 or Claim 24, wherein the  
30 fabric comprises cellulosic fibres.

# INTERNATIONAL SEARCH REPORT

Inter application No  
PCT/ 00/03695

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 C11D3/37

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 C11D C08G D06M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, EPO-Internal, PAJ

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 92 07132 A (PRECISION PROC TEXTILES LTD) 30 April 1992 (1992-04-30)  page 10, line 1 - line 16; claims 1,6,12; example 3	1-6, 8-17, 19-22, 24,25
X	US 5 571 286 A (CONNELL DAVID L ET AL) 5 November 1996 (1996-11-05) cited in the application column 3, line 29 -column 6, line 9; examples 1-4; table III column 7, line 20 - line 42	1-14
X	US 3 753 931 A (RASPANTI G) 21 August 1973 (1973-08-21) column 5, line 26 - line 30; example 1  -/--	1-6,8-13

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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- \*Z\* document member of the same patent family

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# INTERNATIONAL SEARCH REPORT

Inter Application No  
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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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